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ABSTRACT

The paper presents a brief study of the use of computers for instructional purposes with 875 handicapped children; and appendixes list a mathematics skills hierarchy, a language arts hierarchy, excerpts from student reports, and abstracts of studies of computer assisted learning with physically handicapped, learning disabled, and deaf children. Results of the study presented suggest that there are many positive advantages to computer assisted instruction for handicapped children including subjective behavioral advantages demonstrated by the improved attitude of Ss and their peers (who are in charge of proctoring many of the systems). (PHR)

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Computer Assisted Applications for Learning with Special Needs Children

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Computer Assisted Applications for Learning with Special Needs Children.

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University of Manitoba

Background.

The use of computers for instructional purposes is now becoming a realistic possibility. Four major factors have been introduced over the past 12 years which have helped to produce this present situation:

The first, and most important factor is the development of programmed instruction (PI). A means of individualized instruction was first used by Pressey in 1927, and rapidly grew in the late 1950's and early 1960's. The second factor is the rapid growth of the field of electronics, especially miniaturized components. This has caused huge and rapid growths in the field of computer technology to the point where high powered computers can be adapted as an instructional tool. The third factor is the financial aid given to research centres and universities by governments and corporations. The fourth and most recent factor is the fantastic growth in the area of microcomputers with total system costs dropping to $600.00. These four factors have resulted in a rapid expansion in the development and research in the area of computer-assisted learning (C.A.L.).

Most of this research, however, has been with that part of the population who are mentally and physically normal children and adults. These studies have been in universities and in public elementary and secondary schools. In comparison, little attention has been paid to the development of CAL as a useful means of giving instruction to the handicapped and children with special needs.

The real practical use of computer instruction should be with the mentally and physically non-normal portion of the population as well as those with learning problems who need the extra guidance and remediation which a CAL situation can give.

The computer provides vast storage capacity, intricate remediation procedures and high motivational stimuli. Together, these give the handicapped learner a more adequate chance of acquiring academic and social skill knowledge on a scale that was not long ago considered to be unrealistic.

The advantages of computers as an instructional tool for children who have learning problems has been documented in other papers such as Kutson and Prochnow (1972), Sandals, (1973), Hallworth et al. (1974), Hill, (1976), Fiorentino (1977), Reeves,(1978), Sandals et al (1977). Also, considerations for implementation of CAL with children and adolescents with handicaps and learning problems has been discussed by Sandals (1975).

In the past four years there has been some research in Canada using computers as an instructional and diagnostic tool for the mentally and physically handicapped. This research has been carried out at the Vocational Rehabilitation Research Institute in Calgary in conjunction with the computer applications unit at the University of Calgary, and at Rideau Mental Hospital in Smith Falls, Ontario, in conjuction with the National Research Council of Canada and Carleton University. The National Research Council is also researching the uses of computers with children at the Ottawa Hospital for Crippled Children. However, none of these studies, and few anywhere else in the world, are involved in classrooms for the handicapped within the school systems. In the United States, there have been several studies investigating the use of computers with disadvantaged children and those who are deaf and retarded, and recently with the physically handicapped. However, little has been done on a full-scale basis with these children or those with other types of learning handicaps.

Project Objectives.

(a) To use the computer as an adjunctive teaching resource tool in elementary and secondary school, especially for special needs children.
The computer has been and is presently being used with children and adolescents in several different school settings. This project benefits children who are deaf from grades K-12 in a residential school for the deaf, a school for elementary physically handicapped children, a high school for retarded adolescents, a school for learning disabled children, a community college program for deaf college students and instruction in 2 regular elementary schools, a junior high school and high school through the resource teachers in the respective schools. (see Figure 1)

(b) To look at the use of computers as a long term full-time study running over 5 years.

(c) To develop curricular materials in math, lang. arts, and social skills, that will be general to as many schools and special needs children as possible as well as developing specific programs to meet the needs of an individual school with special needs children.

(d) To look at innovative applications of micro-computer technology in Computer Assisted Learning.(CAL).

1) The consortium of users has been trying to implement micro-computers in other urban and rural schools to study the effectiveness and delivery of CAL courseware. Thus, in the rural schools, micro-computer distributive processing systems will be used in comparison to our present larger time shared system. (The micro-computer is

an expanded Radio-Shack TRS-80).

2) The elementary school for the physically handicapped will receive a micro-computer based polymorphic system that has been built by the National Research Council of Canada, the CAL system also utilizes a voice synthesizer as well as an interactive bliss symbolic board. The project is evaluating how effective it may be for a multi-media CAL presentation for handicapped children.

Method.

a) Sample - The children and adolescents who participated in this study on a yearly basis are 60 physically handicapped elementary school children, 150 deaf children from grades 1 - 12, 140 retarded adolescents, approximately 250 elementary students involved in resource programs, 50 high school students involved in resource programs and 100 children in a junior high school for children with learning problems and 25 students in a community college program for the deaf.

b) Apparatus - The project presently uses a CDC Cyber 171 computer, formerly owned by the Manitoba Government. The CAL terminals in the schools include 8 teletypes (ASR 33), 1 decwriter and 2 VUCOM II terminals and 1 computer term portable. We are also presently experimenting with a Radio Shack TSR 80 (16k) level II Basic with eventually a 32k memory and a floppy disk drive as well as a polymorphic System 8813, developed by the National Research Council of Canada with a Bliss Symbolic Board and a votrax speech synthesizer.

c) Courseware - The courseware for this system presently consists of approximately 225 CAL drill and tutorial programs written in the high level language BASIC. They presently average 2,000,000 characters of disk on our Cyber system and delivers (Appendix A) instruction at approximately 1500 skill levels as defined by the math and language hierarchies we have established. The system also produces thorough random generation, criterion referenced worksheets and exams in elementary and secondary math. The project has also developed its own management information system to keep track of students records regarding their lessons on the system.

d) Data source - The data that has been collected consists of designs using repeated measures (overtime, ANOVA designs comparing different experimental groups (computer & other) and control groups on different standardized dependent variables in math and language arts. The Stanford Achievement tests have been used in 3 major studies and the metropolitan achievement tests in another. Future studies will be using criterion referenced tests.

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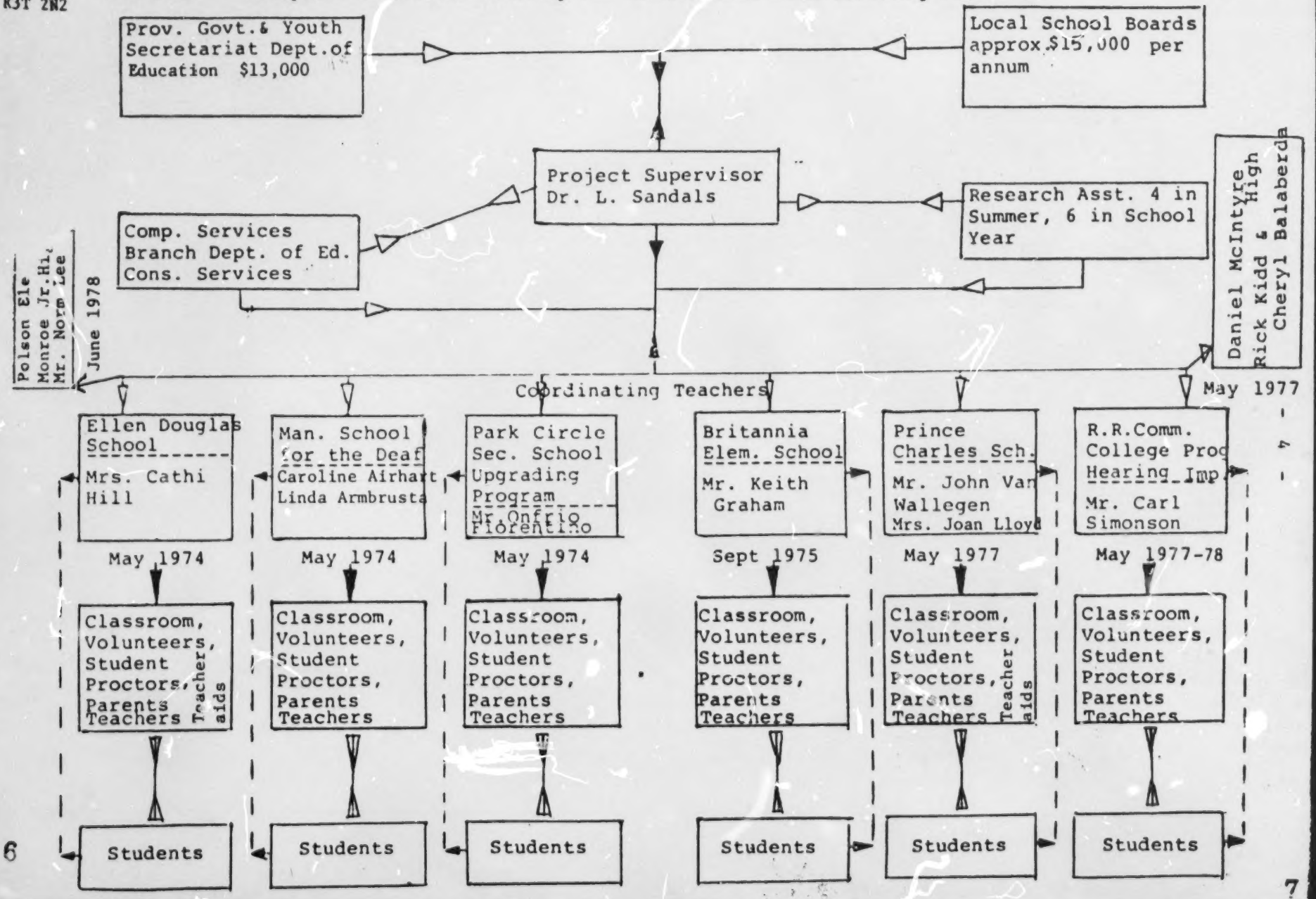
1978 - 1979 School Year

Computer Assisted Learning For Individuals With Learning Problems



Also, N of 1 time series type of analysis have been used to measure individual learning curves per experimental and control groups. (Appendix C) The schools also follow student progress through the record keeping facility of the information system. (Appendix B).

Results.

The results have been extremely positive, not only from a statistical point of view, but also through the educational significance of the results as observed by the teacher, coordinating teachers and school administrators. The statistical results are presented in detail in Hill(1976) Fiorentino (1977) and Reeves (1978), (Appendix C).
There has also been subjective behavioral advantages as demontrated by the improved attitude of not only the students, but also their peers who are in charge of proctoring many of the systems.

Conclusions.

This study demonstrates the practical implementation of a consortium of users from many different areas in the delivery of CAL to many different samples of children with special needs. This project runs on a total cost of approximately $4,000.00 a year per school, which includes all hardware and systems costs as well as software development and program field testing. The cost effectiveness of this model of delivery should be considered in the context of the type of CAL material being delivered and the relationship to the statistical and educational relevance of the studies.

In the Province of Manitoba, some of our most northern school systems are 800 miles from Winnipeg, and may be a one or two room school for grades from 1 - 6. The use of a micro-computer CAL system, utilizing vast amounts of resource materials for these rural school teachers is of prime importance in upgrading the instruction as well as support for the rural classroom teacher and is one of the main new directions our project will be going in the next two years.

References

Fiorentino, Onfrio "Computer Assisted Learning for Children with Learning Problems." Unpublished Master thesis, University of Manitoba, 1977.

Hallworth, H. J. (Session Leader) Symposium "Applications of Computer Assisted Learning with the Developmentally Handicapped." In Proceedings of 18th International Conference on Applied Psychology, Montreal, Quebec, July, 1974.

Hill, C. "Computer Assisted Learning with the Physically Handicapped" Unpublished Master thesis, University of Manitoba, 1976.

Kutson, J. and Prochnow, R. R. Computer assisted instruction for vocational rehabilitation of the mentally retarded, ERIC Document 044 039, 1970.

Reeves, Louis, "Computer Assisted Learning for the Deaf." Unpublished Masters thesis, University of Manitoba, 1978.

Sandals, L. H. CAI with the Developmentally Handicapped. Unpublished Doctoral dissertation, University of Calgary, 1973.

Sandals, L. H. Computer Assisted Learning for the Future: Some Practical Considerations for Research, Especially with Children and Adolescents who have Handicaps and/or Learning Problems. Programmed learning and Educational Technology, 1975, Vol. 21.

Sandals, Knights, Cossalter, Hallworth, Symposium "Computer Assisted Learning for the Handicapped and those with Learning Problems". Presented at the Canadian Psychological Association Meeting, Vancouver, British Columbia, July, 1977.

APPENDIX A

THIS IS A HIERARCHY OF MATHEMATICS SKILLS WRITTEN AS A GUIDE THROUGH THE C.A.I. (C.OMPUTER A.SSISTED I.NSTRUCTION) MANUAL. THERE WILL BE A NUMBER FOR EACH SKILL UNDER EACH OF THE SIXTEEN GENERAL SKILL AREAS AND A BRIEF DESCRIPTION OF THE SKILL. SECONDLY, THE NAME OF THE PROGRAM AND THE NUMBER OF THE DRILL WHERE IT MAY BE FOUND WILL BE PROVIDED. FINALLY, IF THERE IS AN I.O.X. CRITERION-REFERENCED TEST AVAILABLE WHICH CORRESPONDS TO THAT SKILL, THEN A REFERENCE WILL BE MADE. IDEALLY, IT IS INTENDED THAT EACH STUDENT WILL RECEIVE A PLACEMENT WITHIN THE HIERARCHY, BASED ON STANDINGS IN A 'BATTERY' OF I.O.X. MATERIALS. AT THE POINT WHERE A DEFICIENCY IS DIAGNOSED, THE STUDENT WILL BEGIN WITH THE APPROPRIATE REMEDIAL PROGRAM. ONCE HE HAS SUCCESSFULLY COMPLETED THAT SKILL, HE WILL 'JUMP' TO THE NEXT SKILL (THAT IS, THE NEXT I.O.X. REFERENCED SKILL). THE STUDENT NEED ONLY COVER THE INTERVENING DRILLS IF EITHER HE HAS FOUND DIFFICULTY WITH THE NEXT 'KEY' DRILL OR IF THE TEACHER RECOMMENDS FURTHER INSTRUCTION. THERE ARE APPROXIMATELY FIFTY 'KEY' SKILLS, AND THE 'ADVANCED' STUDENT NEED ONLY COVER THE FIFTY CORRESPONDING DRILLS TO COMPLETE THE HIERARCHY. HOWEVER, THE STUDENT REQUIRING MORE REMEDIAL INSTRUCTION MAY GO THROUGH ALL, OR SOME OF THE STEPS BETWEEN THE *** KEY *** DRILLS. THIS HIERARCHY SPANS FIRST THROUGH NINTH GRADE MATHEMATICS, AND COVERS THE FOLLOWING AREAS :

(1) PREARITHMETIC SKILLS

(2) WHOLE NUMBER ADDITION

(3) WHOLE NUMBER SUBTRACTION

(4) WHOLE NUMBER MULTIPLICATION

(5) WHOLE NUMBER DIVISION

(6) WHOLE NUMBER WORD PROBLEMS

(7) FRACTION ADDITION

(8) FRACTION SUBTRACTION

(9) FRACTION MULTIPLICATION

(10) FRACTION DIVISION

(11) DECIMAL ADDITION

(12) DECIMAL SUBTRACTION

(13) DECIMAL MULTIPLICATION

(14) DECIMAL DIVISION

(15) DECIMALS AND PERCENTS

(16) PREPARATORY ALGEBRA

*** MATHEMATICS HIERARCHY ***

LEVEL (1) : PREARITHMETIC SKILLS

1. RECOGNIZING AND TYPING 1-DIGIT NUMBERS
   NUMTYPE : DRILL (1)

2. RECOGNIZING AND TYPING 2-DIGIT NUMBERS
   NUMTYPE : DRILL (2)

3. RECOGNIZING AND TYPING 3-DIGIT NUMBERS
   NUMTYPE : DRILL (3)

4. RECOGNIZING AND TYPING 1 LETTER OF THE ALPHABET
   NUMTYPE : DRILL (4)

5. RECOGNIZING AND TYPING A 2-LETTER SEQUENCE
   NUMTYPE : DRILL (5)

6. RECOGNIZING AND TYPING A 3-LETTER SEQUENCE
   NUMTYPE : DRILL (6)

7. SELECTING A 1-DIGIT NUMBER OUT OF 3 MULTIPLE CHOICES
   NUMREC : DRILL (1)

8. SELECTING A 2-DIGIT NUMBER OUT OF 3 MULTIPLE CHOICES
   NUMREC : DRILL (2)

9. SELECTING A LETTER OF THE ALPHABET OUT OF
   3 MULTIPLE CHOICES
   NUMREC : DRILL (3)

10. SELECTING A 3-LETTER WORD OUT OF 3 MULTIPLE CHOICES
    NUMREC : DRILL (4)

11. FILL IN BLANKS OF A NUMBER SEQUENCE (1 TO 10)
    NUMSEQ : DRILL (1)

12. FILL IN BLANKS OF A NUMBER SEQUENCE (1 TO 25)
    NUMSEQ : DRILL (2)

13. FILL IN BLANKS OF A NUMBER SEQUENCE (1 TO 100)
    NUMSEQ : DRILL (3)

14. COUNTING OBJECTS FROM 1 TO 10
    COUNT 20

15. COUNTING OBJECTS FROMS 1 TO 20
    COUNT 20

16. COUNTING RANDOM SEQUENCE OF GIVEN OBJECTS OF
    LENGTH FROM 1 TO 10
    COUNT 20

17. COUNTING RANDOM SEQUENCE OF GIVEN OBJECTS OF
    LENGTH FROM 1 TO 20
    COUNT20

THIS IS A HIERARCHY OF LANGUAGE ARTS SKILLS WRITTEN AS A GUIDE THROUGH THE C.A.I. (C.OMPUTER A.SSISTED I.NSTRUCTION) MANUAL. THERE WILL BE A NUMBER FOR EACH SKILL UNDER EACH OF THE NINE GENERAL SKILL AREAS, AND A BRIEF DESCRIPTION OF THE SKILL. SECONDLY, THE NAME OF THE PROGRAM OR PROGRAMS AND THE NUMBER OR NUMBERS OF THE DRILLS WHERE IT MAY BE FOUND WILL BE PROVIDED. THIS HIERARCHY SPANS FIRST THROUGH NINTH GRADE LANGUAGE ARTS, AND COVERS THE FOLLOWING SKILL AREAS :

(1) WORD ANALYSIS : PHONIC ANALYSIS

(2) WORD ANALYSIS : STRUCTURAL ANALYSIS

(3) COMPREHENSION

(4) VOCABULARY DEVELOPMENT

(5) LANGUAGE : WORD FORMS AND USAGE

(6) LANGUAGE : SYNTAX

(7) PUNCTUATION

(8) STUDY SKILLS

(9) SPELLING

WRITTEN BY DIANE SLIM

*** LANGUAGE ARTS HIERARCHY ***

LEVEL (1) : WORD ANALYSIS : PHONIC ANALYSIS

1. INITIAL CONSONANT SOUNDS : B,C,D,F,G,H,J,K,L,M,N,P,
R,S,T,V,W,Z
NO DRILL AVAILABLE AS OF YET

2. FINAL CONSONANT SOUNDS : D,K,,L,M,N,P,T,X
NO DRILL AVAILABLE AS OF YET

3. B-D REVERSALS
B-D-P REVERSALS
NO DRILL AVAILBLE AS OF YET

4. SHORT VOWEL SOUNDS : A,E,I,O,U
NO DRILL AVAILABLE AS OF YET

5. LONG VOWEL SOUNDS : A,E,I,O,U
NO DRILL AVAILABLE AS OF YET

6. REVIEW SHORT AND LONG VOWEL SOUNDS
NO DRILL AVAILABLE AS OF YET

7. TWO-LETTER BLENDS : BL, CL, FL, GL, PL, SK, SM, SN,
FR, GR, PR, TR, SC, SK, SL, SM, SN, SP, ST.
NO DRILL AVAILABLE AS OF YET

8. DIAGRAPHS : WH, CH, TH, SH .
NO DRILL AVAILABLE AS OF YET.

9. R-CONTROLLED VOWELS : AR, OR, ER, IR, UR .
NO DRILL AVAILABLE AS OF YET

10. FINAL PHONETIC PARTS : CK, NG, NK .
NO DRILL AVAILABLE AS OF YET

NO DRILL AVAILABLE AS OF YET

12. CONSONANT VARIANTS : C, G .
NO DRILL AVAILABLE AS OF YET

13. DIGRAPHS : QU, PH, KN, WR .
NO DRILL AVAILABLE AS OF YET

14. IRREGULAR PHONETIC PARTS : ICH, EIGH, EAR .
NO DRILL AVAILABLE AS OF YET

15. THREE-LETTER BLENDS : SCH, SCR, SHR, STR, THR,
SPR, SPL .
NO DRILL AVAILABLE AS OF YET

16. RHYMING WORDS WITH ENDINGS SPELLED THE SAME.
RHYME : DRILL (1)

17. RHYMING WORDS WITH ENDINGS SPELLED DIFFERENTLY .
RHYME : DRILL

1. COMPOUND WORDS
FORM THE COMPOUND WORD FROM ITS PARTS.
COMP1 : DRILLS 4,5,6

2. COMPOUND WORDS.
IDENTIFY THE TWO WORDS WITHIN A COMPOUND WORD.
COMP1: DRILLS 1,2,3

3. COMPOUND WORDS
SELECT FROM AMONG THREE CHOICES, THE ONE WORD WHICH IS NOT A COMPOUND WORD.
NO DRILL AVAILABLE AS OF YET

4. CONTRACTIONS
FORM THE CONTRACTION FROM TWO WORDS .
CONTRN : DRILLS 1,2,3,4
SPELB1 : DRILL (9)
SPELA1 : DRILL (9)

5. CONTRACTIONS
CHOOSE FROM 3 CHOICES, THE ANSWER WHICH SHOWS THE EXPANDED FORM OF THE GIVEN CONTRACTION.
NO DRILL AVAILABLE AS OF YET .

6. CONTRACTIONS
SEPARATE THE CONTRACTION INTO ITS TWO PARTS .
CONTRN : DRILLS 5,6,7,8

7. CONTRACTIONS
CHOOSE THE CONTRACTION WHICH CORRECTLY COMPLETES EACH SENTENCE; CHOOSE ISN'T OR AREN'T .
PAIR1 : DRILL (3)

8. CONTRACTIONS
CHOOSE THE CONTRACTION WHICH CORRECTLY COMPLETES EACH SENTENCE; CHOOSE DOESN'T OR DON'T .

CHOOSE THE CONTRACTION WHICH CORRECTLY COMPLETES EACH SENTENCE ; CHOOSE WASN'T OR WEREN'T .
PAIR1 : DRILL (3)

10. CONTRACTIONS
CHOOSE THE CONTRACTION WHICH CORRECTLY COMPLETES EACH SENTENCE ; CHOOSE WASN'T OR HAVEN'T .
PAIR1 : DRILL (5)

11. INFLECTIONAL VARIANTS
IDENTIFY THE INFLECTIONAL VARIANT -S, -ING, OR -ED IN EACH WORD .
NO DRILL AVAILABLE AS OF YET

12. INFLECTIONAL VARIANTS
SPELL THE ROOT WORD OF REGULAR VERBS IN WHICH NO CHANGE WAS MADE IN THE ROOT WHEN THE VARIANT WAS ADDED.
ROOTVR : DRILLS 1,4

13. ROOT WORDS
ROOTVR : WORDS ENDING WITH SILENT E WITH -ING OR -ED

APPENDIX B

BRITANNIA

STUDENT REPORT

MARCH 1973

FINNIGAN DENNIS

*** ROOTVB ***

	DRILL NUM	TYPE	NQ	NR	MARK
73/03/01	2	ROOT	10	10	100
73/03/02	3	ROOT	10	8	80
73/03/03	3	ROOT	10	6	60
73/03/08	4	ROOT	10	10	100
73/03/08	5	ROOT	5	4	80
73/03/14	6	ROOT	15	15	100

FOSTER KIRSTEN

*** POSSESS ***

	DRILL NUM	NQ	NR	MARK
73/03/02	1	10	10	100
73/03/08	5	10	8	80

*** PREFIX ***

	DRILL NUM	NQ	NR	MARK
73/03/11	2	10	10	100

*** ROOTVB ***

	DRILL NUM	TYPE	NQ	NR	MARK
73/03/01	3		10	10	100

APPENDIX C

"Computer Assisted Learning with the Physically Handicapped" (1976)

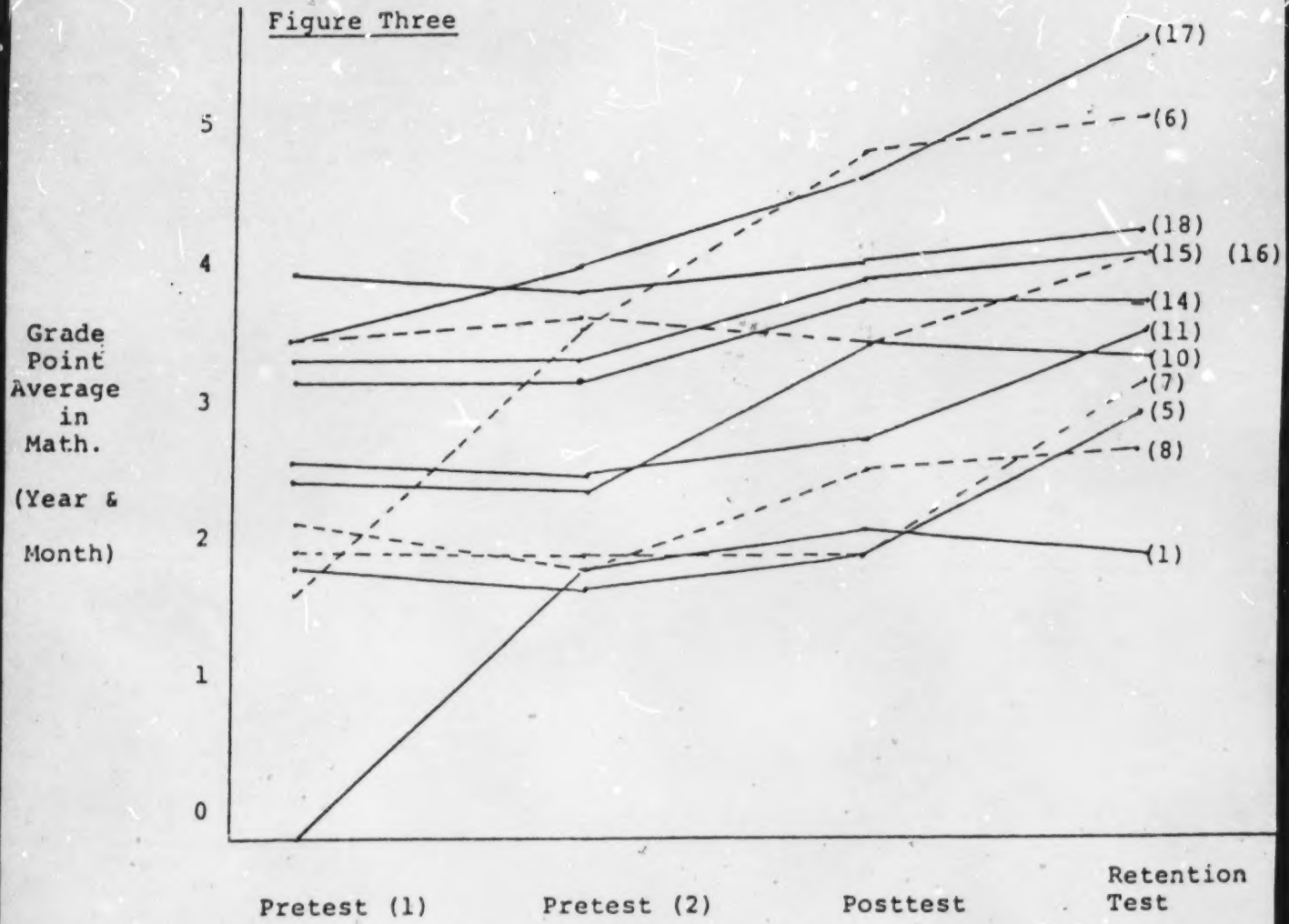
Cathi Hill, Ellen Douglas School

ABSTRACT

This study researched the use of computer assisted learning in mathematics as a drill and practice program for elementary students who were physically handicapped. Two groups of randomly selected students were assigned to control and experimental situations. Both groups received regular classroom instruction, and the experimental group received additional computer assisted learning in mathematics for a period of three months at two days a week. The subjects were administered the Stanford Achievement Test in mathematics before (pretest 1, pretest 2), after (posttest), and three weeks after (retention test) the computer assisted learning sessions.

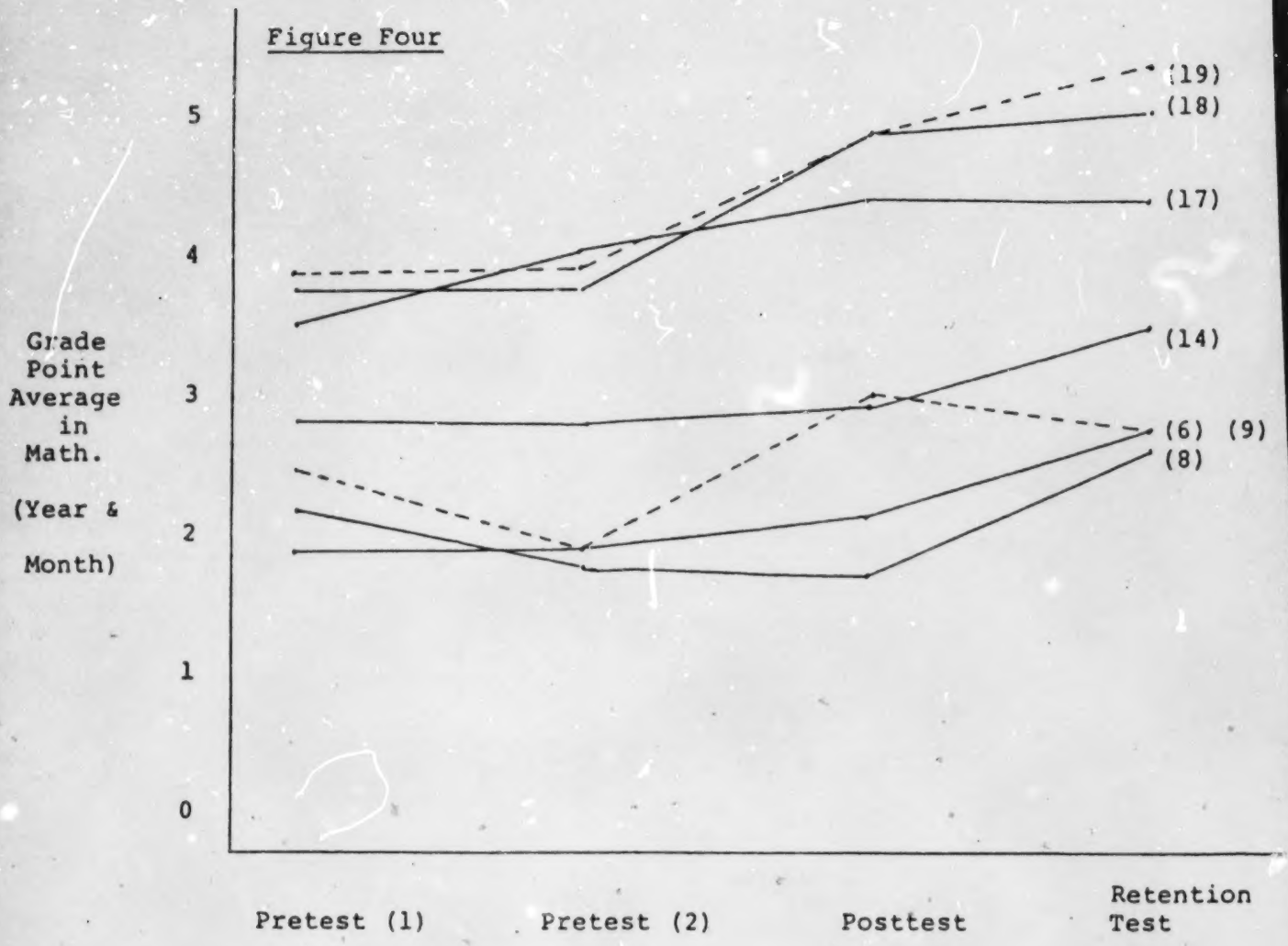
The results of this study showed that there were no significant differences between the two groups. However, there was a significant difference over time between the pretests and posttest and pretests and retention test. Although the results of the study did not show overall statistical significance, some educational relevance was apparent to teachers and administrators. There was a seven month gain for the experimental group during a four month period versus a three month gain for the control group during the same period of time.

Figure Three



Learning Curves of Individuals Showing Gains (Experimental Group)

Figure Four



Learning Curves of Individuals Showing Gains (Control Group)

"Computer Assisted Learning for Children with Learning Problems"(1977)

Onfrio Fiorentino, Park Circle Secondary School

ABSTRACT

This thesis investigates computer-assisted learning (C.A.L.) as applied to junior high pupils that have a wide variety of learning disorders. Drill and practice programs were used as a means of teaching basic computation and spelling skills. Three random groups were randomly assigned to C.A.L. arithmetic, C.A.L. spelling, and Non-C.A.L. treatments. All three groups continued to receive regular classroom instruction. The experimental treatment continued for a three month period on an alternate day basis. The subjects were given the Stanford Achievement Test in Arithmetic and Spelling before (pretest 1 and pretest 2), after (post test), and three weeks after the treatment period.

The results of the study showed that there were no significant differences between the three groups. However, significant differences were found over time for both arithmetic and spelling. In arithmetic, differences were found between: 1) pretest 2 and both the post test and retention test ($p < .01$), and 2) pretest 1 and both the post test and retention test ($p < .05$). Similarly, in spelling, differences were found between; 1) pretest 2 and both the post test and retention test, and 2) pretest 1 and the post test, both at the .01 level of significance. An interaction effect was observed for arithmetic, but not for spelling. Further tests confirmed that the significant differences over time in arithmetic were attributable to the gains made by the C.A.L. arithmetic group. Similarly, in spelling the gains over time were analyzed for descriptive purposes and found to be attributable to the gains made by the C.A.L. spelling group.

The results of this study, therefore, indicated some statistical
ificance and were considered encouraging and significant in the
ext of special education. For example, in arithmetic from pretest 2
he retention test, there was a 5.3 month gain for the C.A.L.
hmetic group compared to a 2.0 month gain for the C.A.L. spelling
p, and a .5 month gain for the non-C.A.L. group. Similarly, in
lling, the C.A.L. spelling group gained 4.9 months compared to
.7 month gain for the C.A.L. arithmetic group and a 1.0 month gain
the non-C.A.L. group.

"Computer Assisted Learning for the Deaf" (1978)

Louis Reeves, Manitoba School for the Deaf.

ABSTRACT

This study investigated the efficac f computer assisted learning (C.A.L.) in language arts and mathematics with students who were severely or profoundly deaf. Three groups of students were assigned by their class groupings to one of three experimental conditions: C.A.L. language arts group; C.A.L. mathematics group; or the C.A.L. combined language arts and mathematics group. All three groups received regular classroom instruction in language arts and mathematics. According to the treatment condition, each group received C.A.L. either in language arts or mathematics or both language and mathematics for six months, two or three times each six day school cycle. The subjects were administered the Stanford Achievement Test (S.A.T.) before (pretest 1 and pretest 2), after (post test) and three weeks after (retention test) the treatment period.

The results of this study showed that there was a significant difference over time. However, the results did not reveal statistical significance among the three treatment groups. Any statistical significance that was obtained was confounded by two factors: the selection of biased treatment groups; and the use of different alternate forms of the S.A.T. (1964). Therefore, it was not possible to derive any meaningful generalizations, or to predict any trends from the experimental data.

Although statistical significance was not obtained in this study, several important observations were noted which have relevant

educational implications. Severely and profoundly deaf students were able to work independently at the computer terminal; and C.A.L. can be a practical means of reinforcing the academic skills of deaf students.